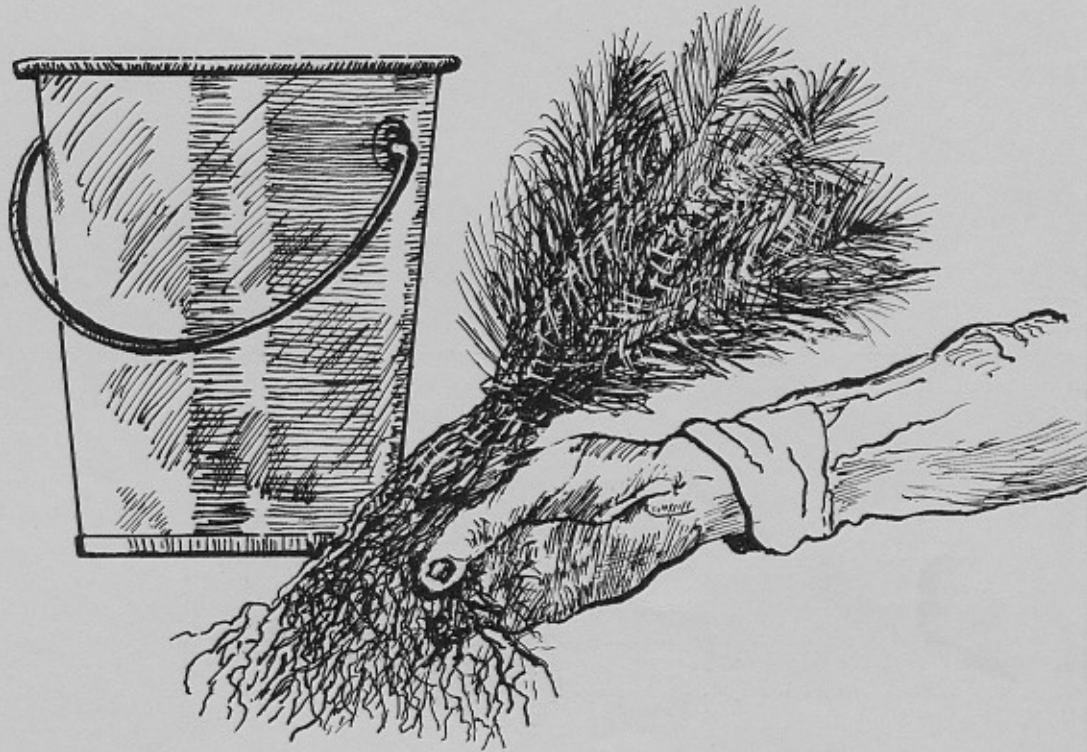




AGRICOL AS A ROOT DIP



Virginia Division of Forestry

Department of Conservation and Economic Development



A Test of Agricol as a Root Dip

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ABSTRACT

In April 1972 a study was installed to evaluate the effectiveness of Agricol ^{1/} as a root dip for loblolly pine seedlings exposed to the sun and air for periods of 0, 30, 60 and 90 minutes prior to planting. Agricol dipped seedlings were compared with undipped seedlings and with seedlings whose roots had been dipped in a water suspension of kaolin clay.

On a moderate drying day Agricol improved survival, but differences were not statistically significant. On a severe drying day Agricol did not improve survival.

DESCRIPTION OF STUDY

Loblolly pine seedlings were lifted on March 9. Seedlings were tied in bundles of 50, and twenty 50 seedling bundles were used to make up packages of 1,000. Three packages were placed in cold storage: one for Agricol dipping, one for kaolin clay dipping, and one for a bare-rooted check.

The seedling roots were dipped on March 14. A 1½ percent solution (by weight) of Agricol in water was used. Although the solution was extremely viscous, and very slow to drain from the roots, penetration of the 50 seedling bundles was complete and good root coverage was obtained. Good penetration and root coverage was also obtained with the kaolin clay suspension. The three packages were put back in cold storage to wait for a warm, sunny, dry day.

The weather finally looked favorable on April 11 and the test was started at 10:00 A.M. Seedlings to be exposed were spread out on boards in the sun. Enough seedlings were placed on the drying boards to plant two replications. While these seedlings were drying, unexposed seedlings were planted. All seedlings were carried in canvas bags while planting, including the exposed seedlings after the proper drying time.

When the test was started at 10:00 A.M. the sun was shining with the air temperature at 71° Fahrenheit and the relative humidity at 36 percent, however, clouds soon began to move in. Between 10:30 and 12:00 noon (while the planting of the two replications was being completed) air temperature ranged between 67 and 68 degrees and relative humidity ranged between 45 and 52 percent. At noon it was decided to stop the test and put the seedling packages back in cold storage to wait for a better day (more severe drying conditions) before installing the other two replications.

The other two replications were installed on April 17 between 12:45 P.M. and 2:45 P.M., using the same procedure as on April 11. This was a much more severe drying day: air temperature ranged from 75 to 78 degrees and relative humidity from 23 to 29 percent. The roots of the bare-rooted seedlings appeared dry when the package was re-opened, while the roots of the Agricol and clay-dipped seedlings were still moist. After exposure and drying, the fine roots

^{1/} Sodium alginate, a product obtained from seaweed.

of Agricol dipped seedlings became very brittle, noticeably more so than clay dipped and bare-rooted seedlings.

A randomized block design was used. A block consisted of a 20 seedling row of each of the 12 treatments. All four replications were installed on a tract of land that had been prepared by prescribed burning following timber harvest. The land is on the Buckingham State Forest in the central Piedmont of Virginia.

MEASUREMENTS

Seedling survival and heights were measured each year, at the end of the growing season, until the seedlings were three years old. Survival changed very little after the first year. The results that follow are based on third year measurements.

RESULTS

Results are shown in Table I and Figure I.^{2/} Opening and closing the packages on April 11, plus the 5½ weeks of storage, may have adversely affected the bare-rooted seedlings. This is suggested by a comparison of survival of unexposed seedlings (0 exposure) for the two planting dates (see Table I).

On April 11, Agricol-dipping appears to have given some protection from drying throughout the 90 minute exposure period. The results for clay-dipping were erratic, and in general, were not much better than for bare-rooted seedlings.

On April 17, survival decreased sharply with increasing exposure time. Neither Agricol or clay seemed to provide protection from drying: with increasing exposure time, survival decreased as rapidly for dipped as for undipped seedlings (with the exception of the Agricol-dipped seedlings after 60 minutes exposure).

Conclusions

Exposure decreases survival!

- ^{2/} The results for the two planting dates were analyzed separately. Survival percents were transformed to arc sin and analyses of variance were made. The effect of root dipping was not statistically significant for either date. The effect of exposure was significant at the .025 level for April 11 and at the .005 level for April 17. The interaction between dipping and exposure was not significant for either date. Differences between treatment means were tested using Duncan's New Multiple Range Test. Within exposure periods, the only significant difference (at the .05 level) between root treatments was between Agricol and bare-rooted seedlings after 60 minutes exposure for the April 17 planting.

Table I. Average Survival at End of Third Season.

<u>Date Planted</u>	<u>Treatment</u>	<u>Survival Percent</u>			
		- - - - - exposure - - - - -			
		<u>0</u>	<u>30</u>	<u>60</u>	<u>90</u>
April 11	Agricol	95	90	90	82.5
	Clay	95	80	65	82.5
	Check	90	80	75	60
April 17	Agricol	97.5	75	75	5
	Clay	97.5	77.5	47.5	22.5
	Check	82.5	62.5	25	12.5

Height growth of surviving seedlings was affected by dipping and exposure in much the same way as survival, as shown in Table II and Figure II. As with survival, the effect of exposure on height growth was much more severe on April 17.

Table II. Average Height of Surviving Seedlings at End of Third Season^{3/}

<u>Date Planted</u>	<u>Treatment</u>	<u>Height in Feet</u>			
		- - - - - exposure - - - - -			
		<u>0</u>	<u>30</u>	<u>60</u>	<u>90</u>
April 11	Agricol	5.23	4.81	4.05	4.40
	Clay	5.00	4.70	4.07	4.32
	Check	4.59	4.35	4.22	3.23
April 17	Agricol	5.18	3.74	3.50	4.05 (2)
	Clay	5.36	4.05	4.02	3.28 (9)
	Check	4.41	3.15	2.81 (10)	2.35 (5)

^{3/} Average heights for some treatments are based on very few seedlings. Figures in parentheses following four of the means for the April 17 planting show number of seedlings surviving out of the 40 originally planted. Treatment means not followed by parentheses are based on 19 or more surviving seedlings.

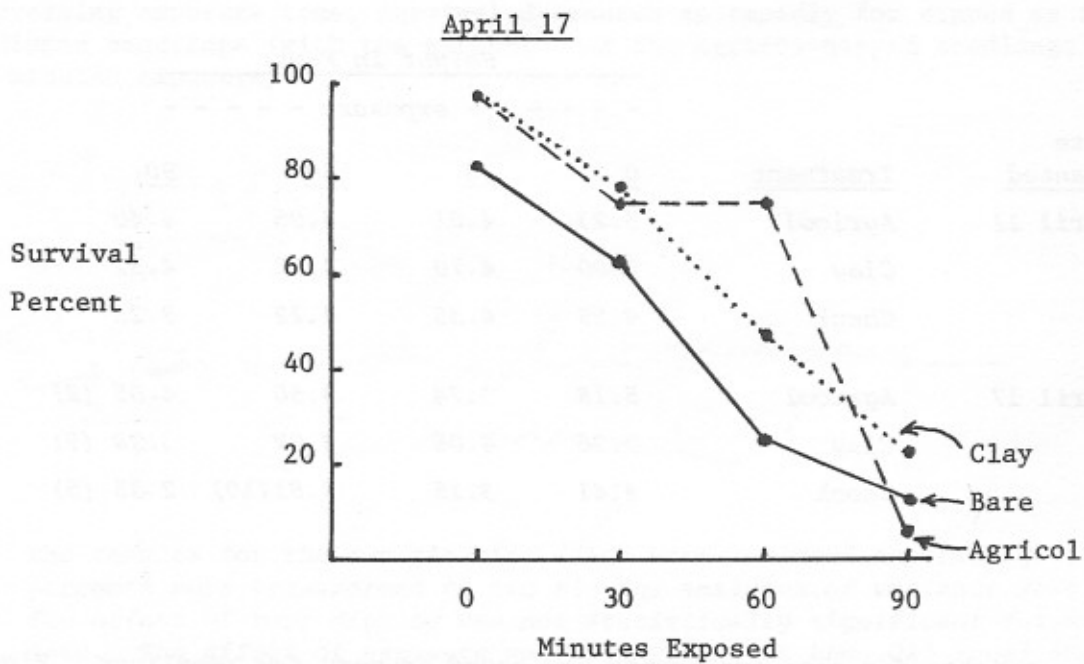
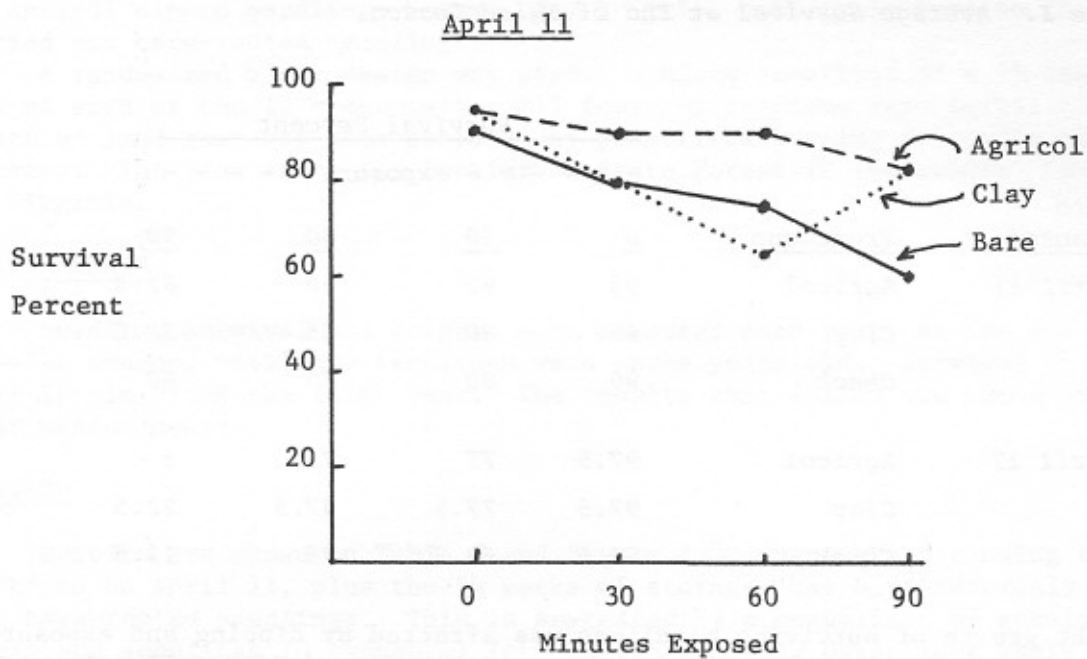


Figure 1. Average Survival after 3 Seasons.

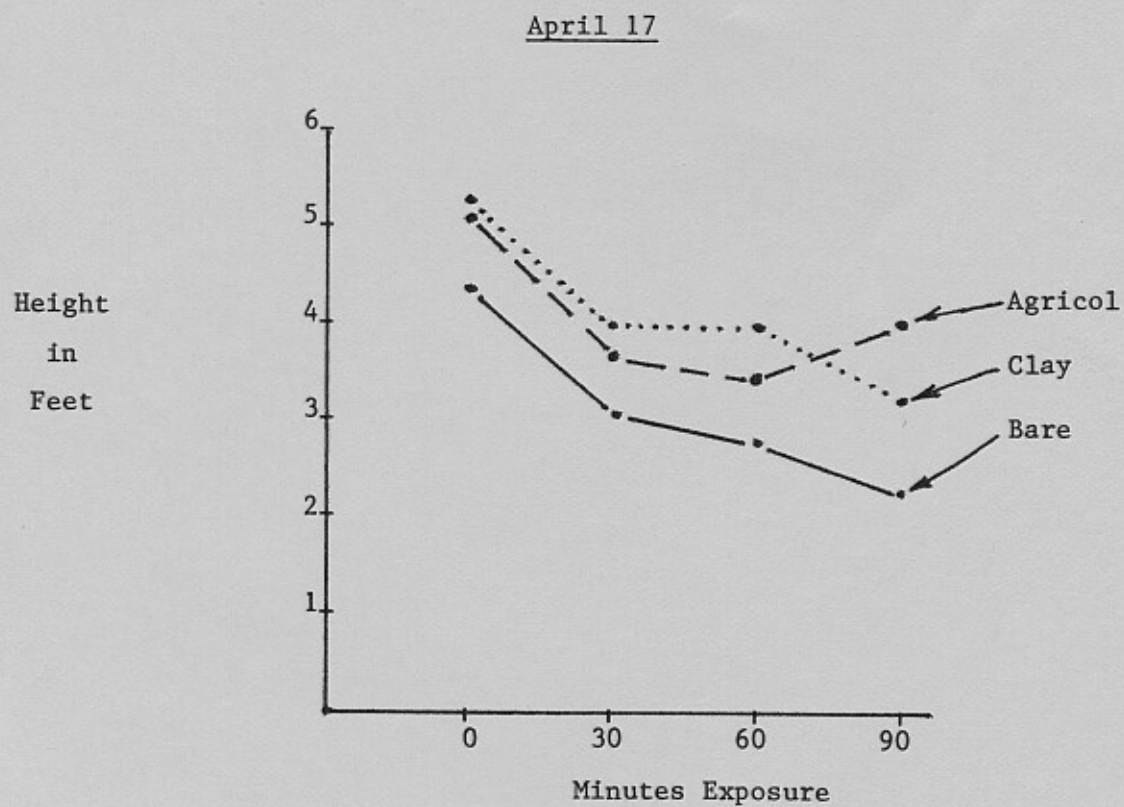
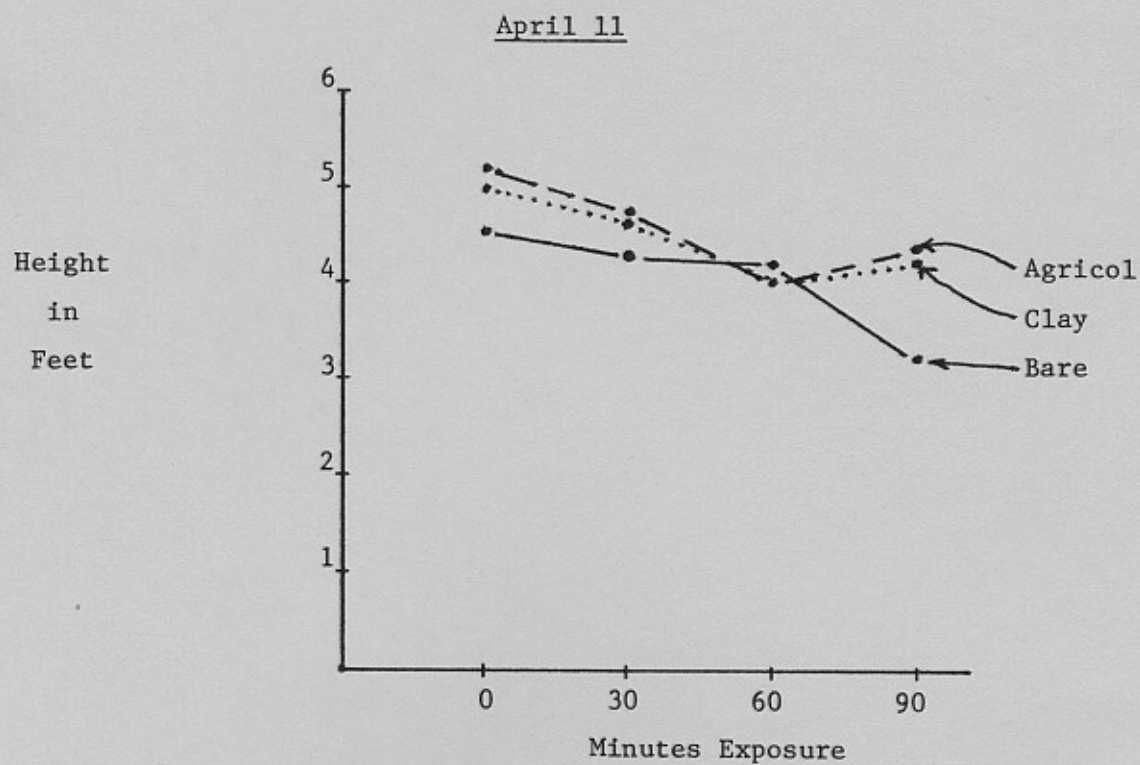


Figure 2. Average Height after 3 Seasons